

Hauptseminar/Master Seminar:

Machine Learning Methods for Computer Vision Applications

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Advanced Seminar Course Module IN8901
Master Seminar Module IN2107
Seminar Module IN0014

CAMP
TUM - I16

Goals of the Seminar

Seminar Topic **Machine Learning and Computer Vision**

Learn how to:

- **Read** scientific papers.
- Research the **state of the art** on a specific topic.
- Write a scientific **report**.
- Do a scientific **presentation**.

Scientific Communication

- **During your studies:** Understand and discuss existing literature related to your own thesis (Bachelor's, Master's, Diploma).
- **Scientific publications (Conference / Journals / Workshops):**
 - Hundreds of conferences and journals on different topics
 - Present your own research and contribution to other researchers
 - Exchange of knowledge, make contacts
 - Confirmation and validation of contributions

Related Conferences / Journals

Conferences

- (CVPR) IEEE Computer Society Conference on Computer Vision and Pattern Recognition
- (ICCV) International Conference on Computer Vision
- (ECCV) European Conference on Computer Vision
- (NIPS) Neural Information Processing Systems
- (SIGGRAPH) Special Interest Group on GRAPHics and Interactive Techniques

Journals

- (PAMI) IEEE Transactions on Pattern Analysis & Machine Intelligence
- (IJCV) Springer International Journal on Computer Vision
- (CVIU) Elsevier Computer Vision and Image Understanding

Previous Years' Papers

Image Processing: Super-resolution



- Glasner, Bagon and Irani: Super-Resolution from a Single Image, ICCV (2009).

Image Processing: Reconstruction



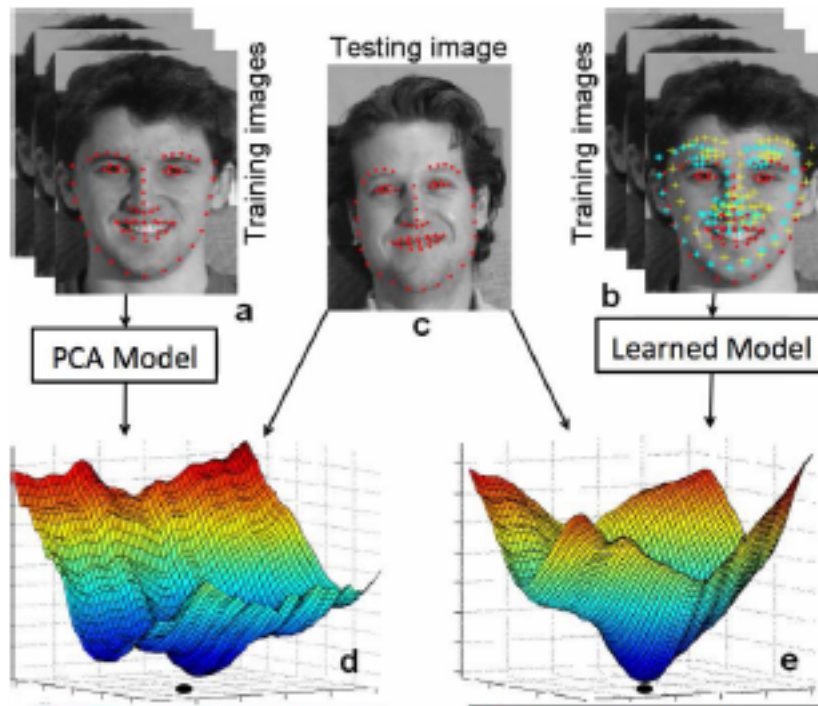
- Takeda, Farsiu and Milanfar: Kernel Regression for Image Processing and Reconstruction, IEEE TIP (2007).

Image Processing: Segmentation



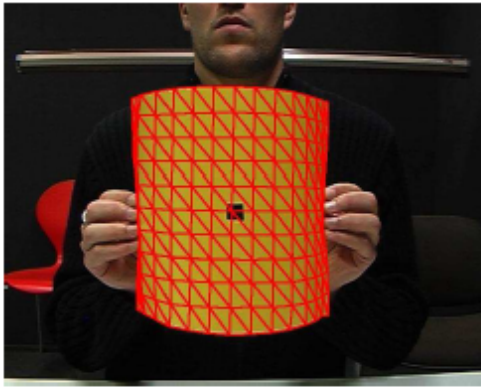
- Duchenne, Audibert, Keriven, Ponce and Ségonne: Segmentation by Transduction, CVPR (2008)

Tracking: Learning similarity



- Nguyen and de la Torre: Metric Learning for Image Alignment, IJCV (2009) .

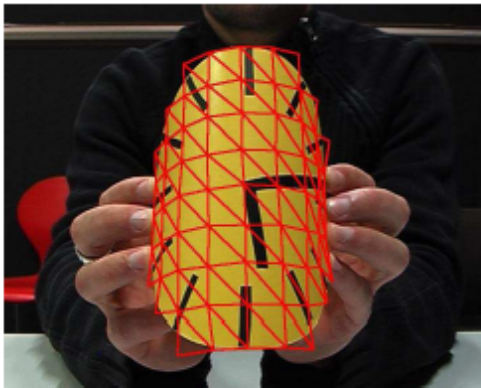
Tracking: Deformable objects



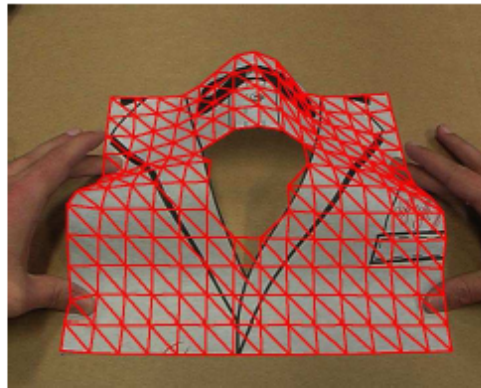
(a)



(b)



(c)

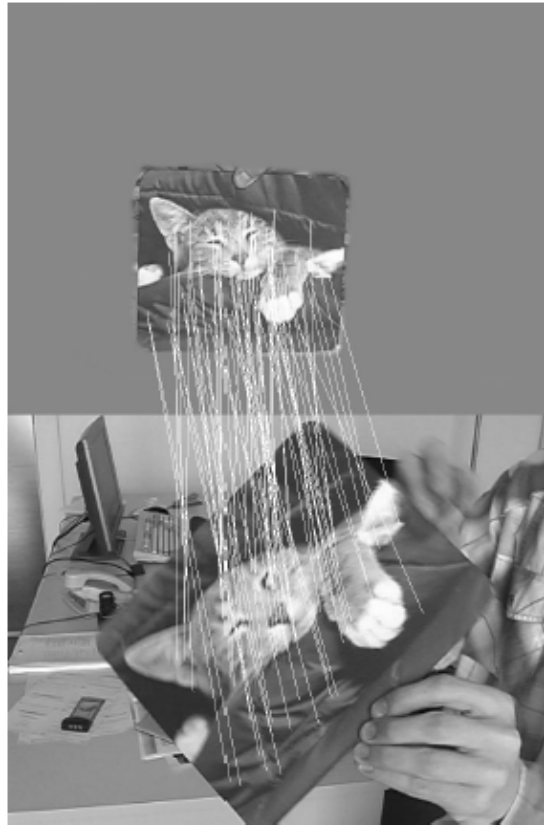


(d)

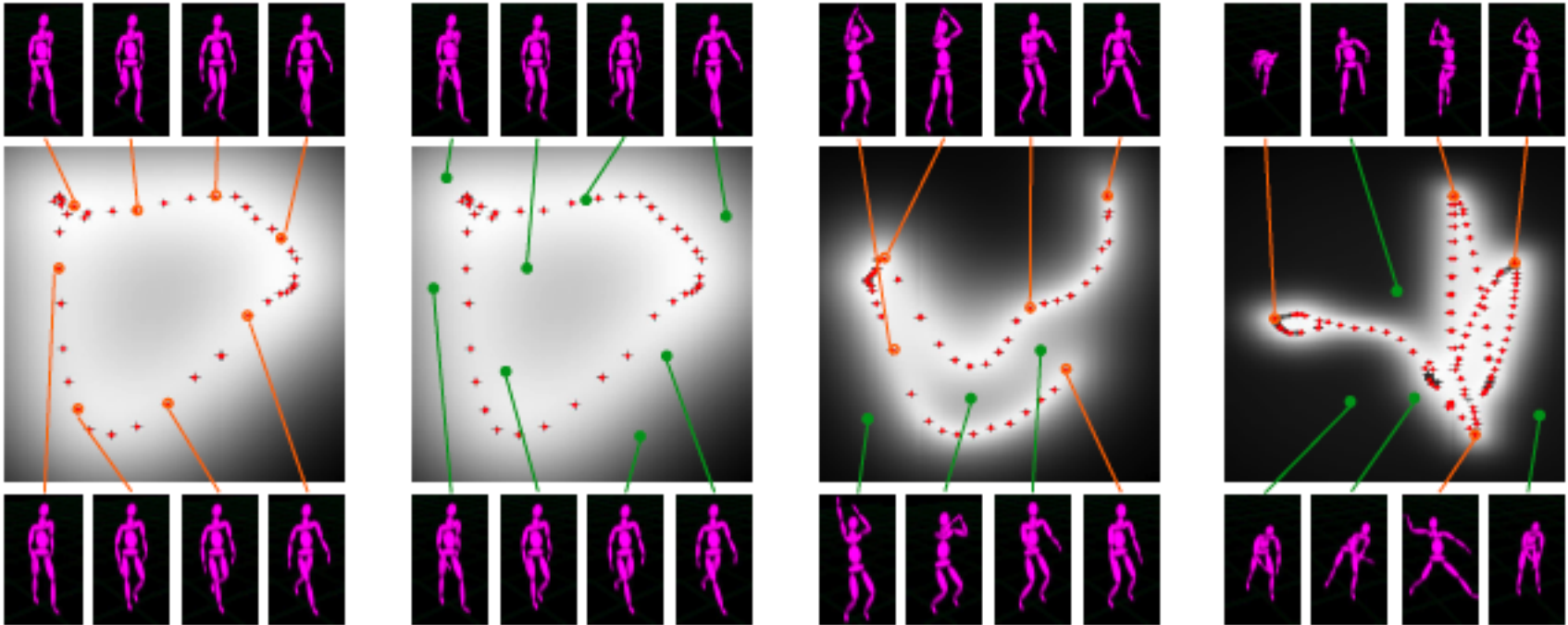
- Mathieu Salzmann, Raquel Urtasun, Pascal Fua. Local Deformation Models for Monocular 3D Shape Recovery. CVPR 2009

Tracking by Detection

- Keypoint Signatures for Fast Learning and Recognition, ECCV (2008).



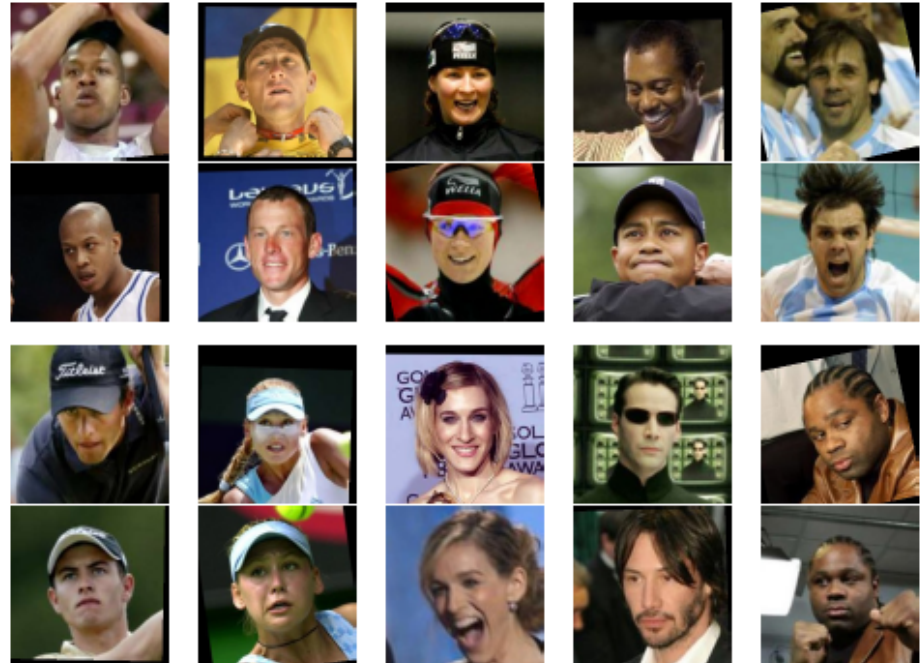
Human Motion Modeling and Analysis



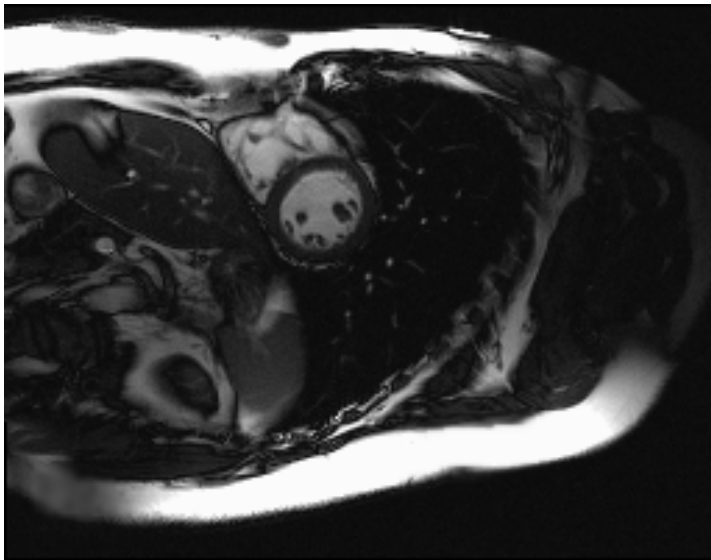
- Style-Based Inverse Kinematics, ACM TOG (2004).

Image Classification

- Guillaumin, Verbeek and Schmid: Is that you? Learning Approaches for Face Identification, CVPR (2009).



Learning in Medical Imaging



- Justin P. Haldar, Bo Zhao, Cornelius Brinegar, Zhi-Pei Liang. Low Rank Matrix Recovery for Real-Time Cardiac MRI.

In Practice...

The Seminar in Practice....

- **SWS: 2+0 ECTS: 4 Credits. Course Language: English**
- ~ 2-3 presentations per session.
- **Presentation: 20 min presentation / 10 min questions.** Download the template from the seminar webpage.
- Write a **report (max 8 pages)**. Download the template from the seminar webpage.
- **Attendance** and participation of the seminar meetings
 - Participation: read the abstract, see figures, read introduction and conclusions.
 - **Prepare questions.**

The Seminar in Practice....

① Prepare



- Read, read and read.....
- Prepare the **presentation** and **report**.

② 2 weeks before



- Fix a meeting (send a mail to your supervisor)

③ 1 week before



- Discuss the report and presentation with your supervisor

④ Presentation



- + questions, exchange of ideas, feedback.

⑤ 1 week after



- Send the final report

Contents of the Presentation

As a rule of thumb: max 1 slide per minute (max 20 slides for 20 mins)

- **Present the paper**
 - Type and year of publication: journal, conference, workshop, etc.
 - Authors/Institution
- **Motivation and Goal**
 - What is the problem that the authors try to solve?
 - Name potential applications: what for?
 - General motivation: why is it interesting?
- **Related Work (state of the art)**
 - Mention most similar approaches and explain how your paper is different from them?
 - **Citing/Referencing other people's work [Lastname-Conference-Year].**
- **Method**
 - **Overview (1 or 2 slides): input, output, contribution (the proposed new elements).**
 - Method/Algorithm (Only key ideas).
- **Results (short version)**
 - Explain the type of **data** used.
 - Validation: what is being validated and how.
- **Conclusion (include your own conclusions!!)**

Related Work: Access to Scientific Publications

- Access to the most publications is not free
- Many publications can be accessed for free using the TUM-proxy
- Some places to look for publications:
 - **Google Scholar** <http://scholar.google.de>
 - **Citeseer** <http://citeseer.ist.psu.edu/>
 - **Our library**
 - Books and electronic media...
 - Link to instructions how to access/download electronic media:
<http://www.biblio.tu-muenchen.de/medien/emedien.html>
 - Link to access/download media outside of the campus:
<http://www.lrz-muenchen.de/services/netzdienste/proxy/documentweb/>

Contents of the Report (Max 8 pages)

Follow the structure of a scientific publication.

- **Abstract and Introduction (~1 page)**
 - General motivation.
- **State of the Art and Contributions (~2 pages)**
 - **Look for related papers, books, websites, videos etc.** e.g. Papers citing the studied work.
 - How is this paper different from (SoA)? e.g. What is new? What is better? What is faster?
- **Problem statement (~1 page)**
 - Mathematical formulation
- **Method (~2 pages)**
 - Overview: input, output.
 - Method/Algorithm.
- **Results (~1 page)**
 - Summary of experiments and results (what type of data and validation).
 - **YOUR CRITIQUE** of the methodology, set-up and validation (what else could have been done?, is it enough to demonstrate the contribution?, is the data biased?, are there non mentioned assumptions?, can it be easily reproduced?)
- **Conclusion (~1 page)**
 - **YOUR PERSONAL CONCLUSION & IDEAS**
- **References (~1 page)**

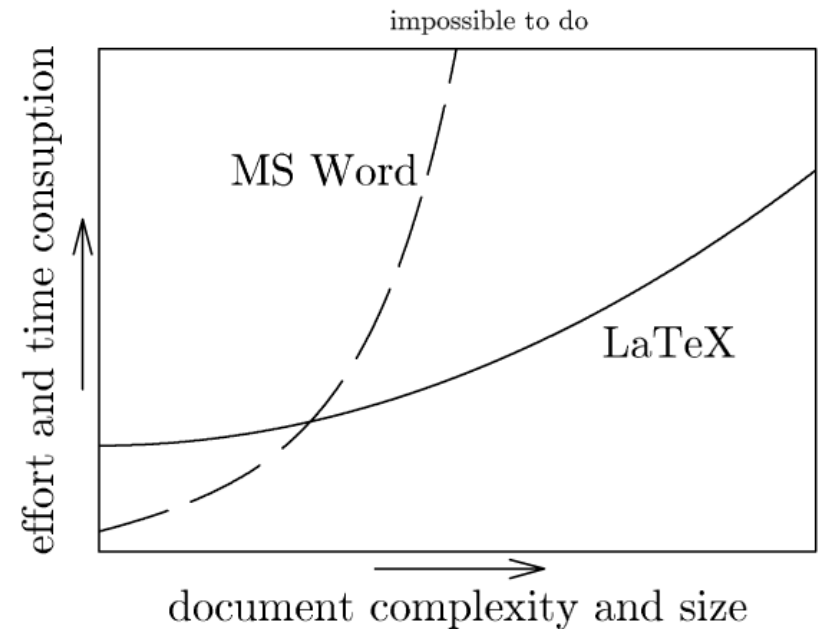
Instructions for the Report

- **Do NOT copy and paste!,**
- **Do NOT copy and paste!,**
- **Do NOT copy and paste!,**
- **Do NOT copy and paste!,**
- **not even a single phrase!**

- Use the LATEX template that is on the seminar webpage.

LaTeX

- Document Typesetting System
- Most widely used by mathematicians, scientists, engineers, philosophers, economists and other scholars in academia and the commercial world [Wikipedia]
- Available free for Windows, Linux and Mac OS
- Download and install LaTeX distribution
 - Windows: MikTeX
 - Mac: MacTeX
- Download and install LaTeX editor
 - TeXicCenter, TexMaker, TexShop



Evaluation Criteria

- Presentation (50%)
 - Understanding (Prepare in advance!)
 - Quality of slides/material
 - Clarity of motivation
 - Clarity of method overview
 - Appropriate use of formulas
 - Personal conclusion
- Report (50%)
 - USE OF OWN WORDS
 - Presentation, language and structure
 - State of the art
 - Personal conclusion

Finally

- Seminar groups are usually heterogeneous. So it is normal if you do not understand the details of each presentation.
- **DO ASK questions** about what is not clear. **This will not penalize** the presenter, they will give you **participation points** and everybody might learn something from it.
- To get detailed **feedback** after your presentation come to our office.
- The **duration** of the presentation will be **strictly controlled**. We will ask you to jump to your conclusions if the indicated duration is exceeded.

Papers & Dates

- Paper list is online – will be finalized by **8th of May**
<http://campar.in.tum.de/Chair/TeachingSs11MLCVSeminar>
- Beginning Monday, **9th of May**, send a mail with your paper of choice (and maybe an alternative choice) to schwarz@in.tum.de (first come first served)
- After **15th of May**, the exact calendar will be put online
- Presentation dates will be in
 - end of June till end of July
 - once a week, Thursdays, 16:00 - 17:30